

J. A. REAMS.
KILN.

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1,223,732.

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Fig. 1.

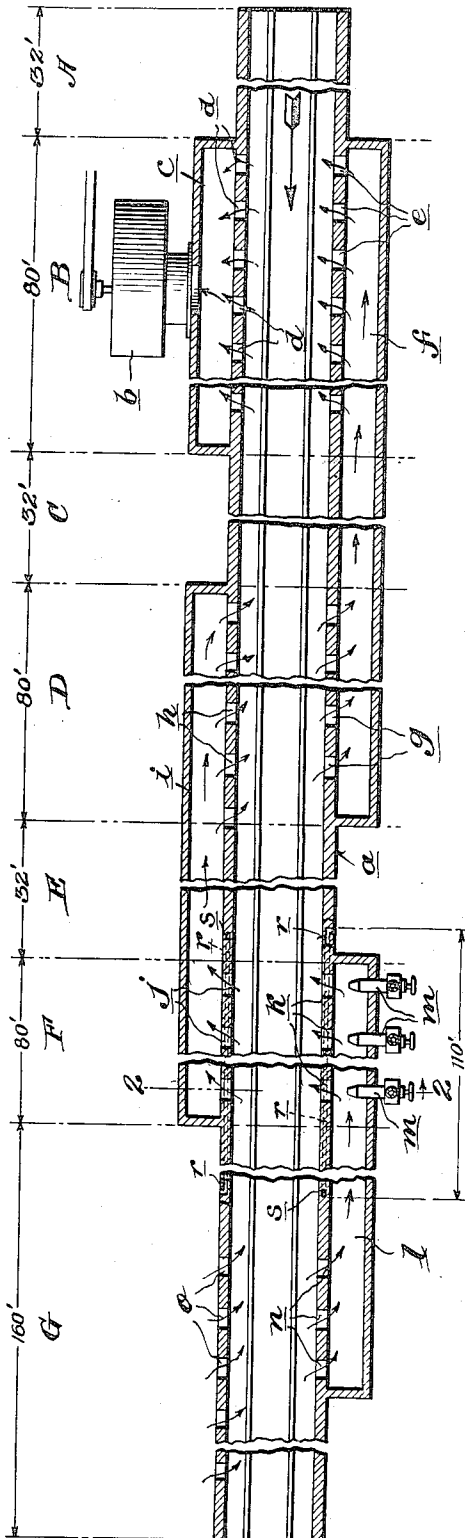


Fig. 2.

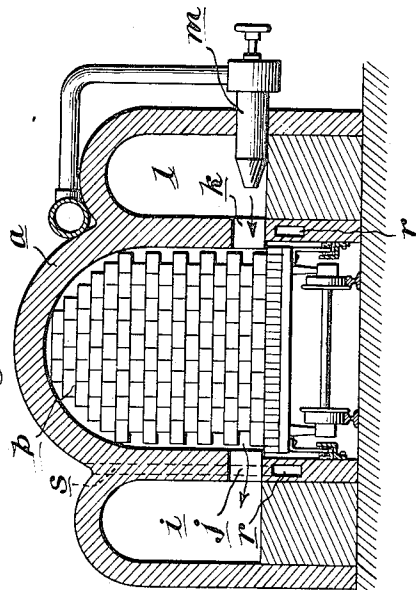
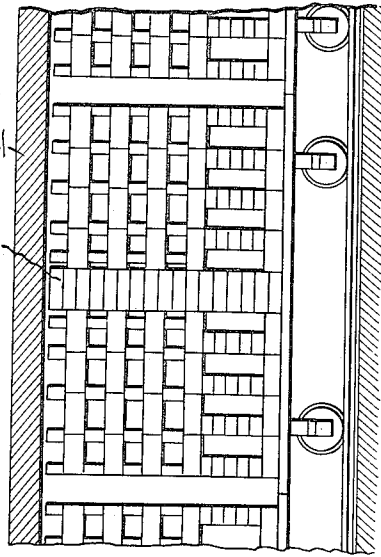


Fig. 3.



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To all whom it may concern:

Be it known that I, JOSEPH A. REAMS, a citizen of the United States of America, and a resident of Richmond, county of Henrico, State of Virginia, have invented certain new and useful Improvements in Kilns, of which the following is a full and clear specification.

This invention has relation to that type of kiln in which a continuous series of cars with bricks or other articles to be burnt is carried through a tunnel in a direction opposite to the passage through the tunnel of a current of highly heated products of combustion, so that during the passage through the tunnel the bricks are first dried and then burned and finally cooled off as they emerge from the exit end of the tunnel, as more fully hereinafter set forth.

The object of my present invention is to not only provide for a more uniformly burnt and colored product, but also to reduce to a minimum the cost of operation, as more fully hereinafter set forth.

In the drawing—

Figure 1 is a horizontal sectional view of a kiln constructed in accordance with my invention;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1; and

Fig. 3 is a longitudinal section of a portion of the kiln tunnel showing especially the manner of loading the cars.

Referring to the drawings annexed by reference characters, *a* designates the open-ended tunnel constructed in any suitable manner of masonry, *b* the exhaust mechanism for creating the current through the tunnel, this exhaust mechanism having its inlet in communication with the flue *c* extending along one side of the tunnel and communicating with a series of openings *d* in the adjacent side wall of the tunnel. Opposite the openings *d*, the other wall of the tunnel is provided with a corresponding series of openings *e* which communicate with a flue *f* formed on the outside of the wall of the tunnel. This flue *f* extends for a considerable distance along the side of the tunnel, and, at the end opposite the openings *e*, this flue communicates with the interior of the tunnel by another series of openings *g*, the tunnel wall between the group of open-

ings *g* and the group of openings *e* being imperforate. Opposite the openings *g* there is another series of openings *h*, substantially corresponding in area and number with the openings *g*. The openings *h* are covered by a flue *i* built along the adjacent exterior of the kiln, and this flue *i* extends a considerable distance along the side of the tunnel and at its other end communicates with the interior of the tunnel by means of another series of openings *j*. Opposite the group of openings *j* there is another group of openings *k*, and covering these openings is another side flue *l* in which is located the gas burners *m* or other heating appliance, such as oil burners or a grate furnace or furnaces.

The flue *l* extends along the wall of the furnace and is again put into communication with the tunnel by means of a group of openings *n*, and opposite this latter group of openings *n* the wall is provided with another group of openings *o*, which put the interior of the tunnel into direct communication with the atmosphere. The direction of the air and products of combustion through the kiln is indicated by the small arrows, and the direction the cars move through the tunnel is indicated by the large arrow at the right-hand end of Fig. 1. It will be observed that cool air enters the tunnel through the openings *o*, crosses the tunnel and enters the combustion flue *l*, whence the products of combustion cross the tunnel in the opposite direction through openings *k* and *j* to the flue *i*. From the flue *i* the products of combustion again cross the tunnel and enter the flue *f*, whence they cross the tunnel still another time and pass out through the exhaust apparatus. It will be observed that each carload of bricks passes from the entrance zone A into the drying zone B, where the bricks are subjected to the products of combustion after the same have been considerably reduced in temperature; thence the bricks pass into an intermediate zone C, where the drying process continues; thence into the zone D, where the preparatory or preliminary burning takes place; thence the bricks pass into the zone E, where the stored-up heat in the bricks continues the burning of the bricks; thence, the bricks pass into the zone F, where they are subjected to intense heat, thus completing the

burning operation. From the final burning zone the bricks pass into the cooling zone G, where they are subjected to the action of atmospheric air on its way to the combustion apparatus.

In order to insure the foregoing circulation of air and gases, I build on each car, preferably out of green brick that are to be burnt, a baffle wall *p*, shown in Fig. 3, the remainder of the brick carried by the car being preferably arranged on the opposite sides of this wall. When the cars are provided with these baffle walls, a vastly larger proportion of the gases are compelled to take the serpentine course described above. Of course, it is not feasible or even desirable that these baffle walls shall fit against the tunnel interior closely enough to prevent air and gases passing between their edges and the tunnel wall, but this comparatively small amount of air and gases will be beneficial in that it will tend to promote a slight circulation of air and gases longitudinally of the tunnel and thus tend to a more thorough drying and burning of the product.

It will be observed that the bricks when in zone F will be subjected to a higher heat on the side of the furnace than on the other side, but this will be equalized by the fact that in the zone D the bricks are subjected to a higher heat at the opposite side of the tunnel than they are on the furnace side; the same may be said with respect to the action of the gases on the bricks as they pass through zones B and D, the bricks being more highly heated in zone B at the flue side *f* than at the other side, but this unequal heating of the bricks will be offset by the fact that in zone D the bricks are more highly heated at the opposite side. It will be observed, therefore, that by dividing the kiln up into zones and carrying the products of combustion alternately back and forth laterally through the kiln, the bricks will be burned uniformly and without discoloration. It will be observed also that the heating of the bricks will be gradually accomplished as they pass through each of the zones B, D and F, thus tending materially to a uniform and well burnt product. It will be observed also that there is practically no loss of heat, except, of course, by radiation, since it is calculated that practically all the heat will be taken out of the gases by the time they reach the exit flue *e*. It will be observed also that by carrying the burning medium back and forth directly across the kiln, I obtain the shortest paths and thus not only reduce greatly the friction of the passage of the products of combustion, but I am also enabled to employ the maximum length of burning and drying zones. For instance, in a kiln approximately five hundred feet in length, I will be able to give to the drying and burning zones

B, D and F a length of eighty feet each and at the same time be able to pull the hot gases through the tunnel without the employment of an abnormally-sized exhaust apparatus.

It will be understood that while I have described my kiln for burning brick, it is equally adapted for burning other articles, and I therefore wish it understood that I am not restricted in any way so far as the use of my apparatus is concerned.

I desire it also understood that I may provide an air flue *r* in each of the combustion zone walls, directly under the openings *j* and *k* for the purpose of preventing these walls becoming so hot as to injure the passing trucks. These flues may be open to the atmosphere at one end and at the other end they may open into stacks *s* so that when the exit end of the flue is left open, it will set up an automatic circulation of air through each flue. The exit ends of these flues may be plugged up until the walls get so highly heated as to injure the trucks and then the plugs may be removed to insure a circulation of air.

Having thus described my invention, what I claim is:

1. In a kiln, the combination of an open-ended tunnel through which carriers containing objects to be burned may be continuously passed, and means whereby air is caused to pass laterally across the tunnel in a zone at the exit end thereof, thence back across the tunnel in the form of products of combustion, thence again across the tunnel in another zone, and thence finally across the tunnel in still another zone at the inlet end of the tunnel, said means embodying an exhaustion apparatus at the inlet end of the tunnel, groups of openings in the opposite walls of the tunnel in each zone, outside flues connecting the openings in one group with the openings in the next group, and a combustion apparatus in the second zone from the exit end of the kiln.

2. In a kiln, the combination of a single open-ended tunnel through which carriers containing objects to be burned may continuously pass, and means whereby air is caused to pass laterally across the tunnel in a zone at the exit end thereof, thence back across the tunnel in the form of products of combustion, and finally across the tunnel in still another zone at the inlet end thereof, said means embodying an exhaustion apparatus at the inlet end of the tunnel, openings in the opposite walls of the tunnel in each zone, flues connecting the openings in each zone with the openings in the next zone, and a combustion apparatus in the second zone from the exit end of the kiln.

3. In a kiln, the combination of a single continuous open-ended tunnel, through which cars containing objects to be burned may continuously pass, the walls of this tun-

nel being provided with separated groups of openings, flues connecting the openings of one set with the openings of an adjacent set, means whereby products of combustion are caused to pass back and forth across said tunnel through said openings to the flues from the exit end toward the inlet end of the tunnel, cars adapted to pass through said tunnel, each car being provided with a baffle wall forming a movable partition in the tunnel, for the purpose set forth. 10

In testimony whereof I hereunto affix my signature.

JOSEPH A. REAMS.